

## Preliminaries

CS5540 HCI  
by  
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Fall 2004

## What is the HCI Issue?

- Is the interface the concern?
- Is the issue a matter of accomplishing work, some set of tasks?
- Are we focusing on wrong thing?
- We don't discuss telephone interfaces often.

## "Doing Work" View - 2

- Need to understand the user and human behavior
- How does an architect approach a custom home design for a new client?

## What good interface principles do we already know? - 1

- Interesting, pleasing, attractive, inviting
- Effective to use
- Intuitive: Alan Kay's children
- Organized, hierarchically structured, clean

## What good interface principles do we already know? - 2

- Help functions, Search, etc
- Consistent form (aka design integrity)
- Automatic assistance
  - Completions
  - Spelling

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## What good interface principles do we already know? - 3

- Lead the user
  - Prompts
  - Indicate nature of any problem
  - Specific communication
- Navigational aids: systems often huge

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# Bookmark

Pick up here...

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## What good interface principles do we already know? - 4

- Meaningful error msgs
  - Don't send you elsewhere
  - Give useful number
  - Area of inadequate traditions
- Multiple paths to a function
- Keep it simple

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## What good interface principles do we already know? - 5

- Gain user's trust
- Bottom up is probably most acceptable
- Simple tasks should be simple
- WYSIWYG – easy to get started
  - Piano v violin

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## Our history hurts us... - 1

- Developed some poor communications habits
- Natural language is terribly ambiguous
- Resources were scarce
- Other priorities, historically

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## Our history hurts us... - 2

- Error Messages
  - Early computing: "Compiler error"
  - Even now: Sys Error EM732851
  - Error from wrong module: Latex
- Small road signs
- Confusing directions
  - 400 S HOV Interchange on I15

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## Our history hurts us: KE007 - 3



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## Our history hurts us... KE007 - 4

- Korean Airlines Flight 007
- 269 onboard, veered over Soviet airspace in Pacific, and was shot down
- Pilot/Navigator keyed in numerical coordinates by hand for flight plan!

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## Our history hurts us... KE007 - 5

How about:

- Automatic download?
- Picking from a menu?
- Symbolic names?
- Confirmation playback?

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## Our history hurts us... KE007 - 6

How about:

- Context check (like type-checking...)?
  - Pilot, run, time, plane, schedules, assignments, etc

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## Our history hurts us... KE007 - 7

How about:

- Monitors, Alarms, Inhibitors?
- Confirmation message?
  - Aviation tower communications
  - Telephone technical conversations
- Parity checks?

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## Our history hurts us... - 8

### Audi

- Cars took off from a standing position
- Driver error, claimed Audi...
- Whose error was it?

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## Our history hurts us... - 9

- NASA space probe
- Lost major mission over units mistake
- JPL group worked in SI units
- Colorado group worked in English units
- Combining the results led to bad numbers
- Type checking issues?

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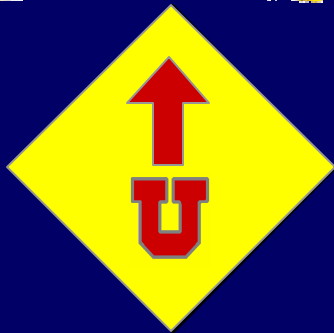
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## Culture -1

What does  
this sign  
mean?



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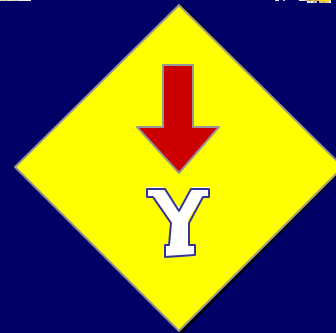
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## Culture -2

What does  
this sign  
mean?



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## Culture-3

- Up is better than down
  - Religion, Dante, ...
- When we refer to ourselves
  - We point to our noses?
  - Our chests?
- Point with index finger or hand ?

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## Critical Interfaces

- Nuclear power plants
  - Interface had better be clear
- Airplane cockpit
  - Computer graphics has simplified controls, information
- Power saw, laser indicator

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## Effect of *Function*: Examples

- Water faucets in a sink
- Manual gear shift: 4 on the floor
- Chords on a guitar: hard!
- Interface is dictated (confused) by needed function

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## Other Historical Examples

- Books are essentially linear
- Stories or communications needs are not
- Hyper-text
  - Breaks the shackles of linear text stream
  - Digress as needed, desired

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## HCI is a Design Problem

- Design is old subject
- Well studied, rich traditions
- Apply design methodologies to build better interfaces
- We will look at this viewpoint

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## Important Operational Issues

- Reliability
- Availability
- Security
- Data integrity

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## Important Basics

- Standardization across app's
  - Apple did this first
- Integration of packages and tools
  - Unix does this well
- Consistency in actions, design style, terms, menus, color, fonts, etc
- Portability across platforms
  - Less than advertised (Quicken, eg)

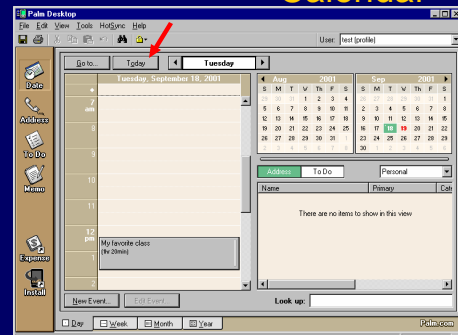
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## Palm Desktop Calendar



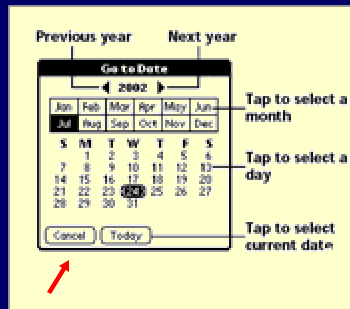
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## Palm Handheld Calendar



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## Important Stats -1

- Time to learn
- Speed of performance
  - How much coffee can one drink?
- Rate of errors by users
  - "The user is always right!"

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## Important Stats -2

- Retention over time
  - Do you have to start at square 1?
- Subjective satisfaction
  - Do you like it (no explanation needed!)
  - Can you develop attachment for it?

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## Dramatically Different Needs - 1

- Life-critical systems
  - Air traffic; nuclear reactors; cockpits; power utilities; emergency, military, medical, operations
- Commercial
  - Banks, resv's, inventory, point-of-sales (Hertz, Fedex,..), registration,..

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## Dramatically Different Needs - 2

- Home, office, entertainment
  - Obvious needs
- Exploratory, creative, cooperative systems
  - Bad interface (computer or otherwise) can destroy the process

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## Human Diversity

- Ergonomics, anthropometry
  - Anyone here "average?"
- Physical consideration
  - Height, stiffness, posture, shapeness, size of working area
  - IPD, headsize, light sensitivity

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## Cognitive Processes (from Engineering Abstracts) - 1

- Short-term memory
- Long-term memory
- (Over 40 year old users...)
- Problem solving
- Decision making

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## Cognitive Processes (from Engineering Abstracts) - 2

- Attention and set (scope of concern)
  - ADHD, Ritalin population (5%)...
- Search and scanning
- Time perception

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## Perceptual and Motor Performance Factors (ibid) - 1

- Arousal and vigilance
- Fatigue
- Perceptual (mental) load
- Knowledge of results
- Monotony and boredom

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## Perceptual and Motor Performance Factors (ibid) - 2

- Sensory deprivation
- Sleep deprivation
  - New driving regulations
  - Medical interns/residents
- Anxiety and fear
- Isolation

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## Perceptual and Motor Performance Factors (ibid) - 3

- Aging
- Drugs and alcohol
- Circadian rhythms

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## Gender Differences

- Males and Females are different!
- Much has been observed
- Firm principles are scarce

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## Carl Jung's Personality Differences - 1

- Extrovert v Introvert
  - Extroverts like action
- Sensing v Intuition
  - Routine v discovering new

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## Carl Jung's Personality Differences - 2

- Perceptive v judging
  - New situations v planning
- Feeling v thinking
  - Sensitive v logical

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## Recent Study Result ...

- Multi-tasking does not work!
- Ergo, one should not:
  - Drive a car
  - Talk on a mobile phone
- Q: Is driving a car a single task??

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## Cultural & International Diversity - 1

- Characters, numerals, special characters, diacriticals
- Left-to-right v right-to-left v vertical in reading
- Date and time formats
- Numeric and currency formats

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## Cultural & International Diversity - 2

- Weights and measures
- Telephones and addresses
- Names and titles
  - Mr., Ms., Mme, M., Dr.
- SSNs, national IDs,
- Capitalization and punctuation

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## Cultural & International Diversity - 3

- Sorting sequences
- Icons, buttons, colors
- Pluralization, grammar, spelling
- Etiquette, policies, tone, formality, metaphors.

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## Users with Disabilities

- Can truly open doors
  - Man with ALS who uses head to type
- Doing it well requires good client model
- Designer challenges

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## Evaluating Interfaces - 1

- Understanding of a practical problem
- Lucid statement of a testable hypothesis
- Manipulation of small number of independent variables
- Measurement of specific dependent variables

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## Evaluating Interfaces - 2

- Careful selection and assignment of subjects
- Control for bias in subjects, procedures, and materials
- Application of statistical tests
- Interpretation of results, refinement of theory, and guidance for experimenters

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## Possible Research Directions - 1

- Reduced anxiety of computers
- Graceful evolution of systems
- Specification and implementation of interaction
- Direct manipulation

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## Possible Research Directions - 2

- Input devices
- Online assistance
- Information exploration

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End of Lecture Set 1  
*Preliminaries*